CHAPTER 25: Electrical Safety

25.1 Training and Work Practices

The ***MIOSHA General Industry Safety Standards – Part 40*** contain rules covering electrical safety-related work practices for both qualified and unqualified persons.

Qualified persons are defined as those who work on or near installations of electrical conductors, and equipment within or on buildings or other structures, and on other premises. Qualified persons are also those who perform installations of conductors that connect to the supply of electricity, installations of other outside conductors on the premises, and installations of optical fiber cable where such installations are made together with electrical conductors.

Unqualified persons are those with little or no training who work on, near, or with the same installations as listed above.

25.1.1 Training Requirements

You must provide training on safe work practices and the specific requirements of each job assignment where the employee will face a higher than normal risk of injury from electrical shock. This includes the following employees:

- Employees intentionally exposed to live parts (electricians, electrical troubleshooters, general maintenance workers);
- Employees who may be exposed to a known, limited electrical hazard related to a specific job assignment (e.g., a janitor cleaning in an electrical room or changing light bulbs);
- Employees who are not assigned to any electrical work but whose jobs place them in a position where they need to be mindful of casual exposures to exposed live parts (machine operators, material handlers, janitors); and
- Employees who use or handle electrically-operated equipment.

Training for employees can be either classroom or on-the-job.

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25.1.2 Selection and Use of Work Practices

You must insure that employees performing work near or on equipment or circuits that may be or are energized, utilize electrical safety-related work practices. These practices are intended to prevent electrical shock or other injuries to your employees resulting from either direct or indirect electrical contacts.

De-energize live parts to which an employee may be exposed before allowing an employee to work on or near those parts. Work on or near live parts is permissible if it can be demonstrated that de-energizing isolates the parts and protects the employee from coming in contact either directly or indirectly with some other conductive objects.

25.1.3 Work Practices/Procedures

If you ask employees to work on or near an exposed de-energized part and the employees may be exposed to electrical shock if equipment is re-energized, MIOSHA requires that you develop and utilize a procedure to lockout and tag equipment at the electrical source to prevent re-energizing the equipment. Chapter 26 provides further detail on lockout and tagout procedures.

If a lock cannot be used or the employer can demonstrate that tagging procedures will provide safety equal to a lock, a tag may be used without a lock. In these cases, all of the following must occur:

- The tag must be of a distinctive employer design that clearly prohibits unauthorized energizing of the circuits and removal of the tag.

- A tag shall not be used without an additional safety measure, such as the removal of an isolating circuit element, the blocking of a controlling switch, or the opening of an extra disconnecting device.

- All persons who have access to controlling devices shall be trained in, and familiar with, the employer's tagging procedures.

- The situation must meet the requirements of ***MIOSHA's General Industry Safety Standards – Part 37, Accident Prevention Signs and Tags***.

25.1.4 Cord- and Plug-Connected Equipment

If you use cord- and plug-connected equipment or extension cords in your printing establishment, you must follow these safety requirements:

- Handle equipment in a way that does not cause damage. Extension cords must not be attached with staples or in another manner that would cause damage to the outer jacket or insulation.

- Visually inspect extension cords and cord- and plug-connected equipment at the beginning of each shift for external defects such as loose parts, deformed and missing

pins, or damage to the outer jacket or insulation, and for evidence of possible internal damage such as pinched or crushed outer jacket. This should be done whether the plug is inserted each time or if equipment or cords remain connected.

- Remove defective or damaged items from service and do not allow employees to use them.

- Use attachment plugs or receptacles that provide proper continuity of the equipment grounding conductor.

- Be sure that portable electric equipment and extension cords used in highly conductive work locations are approved for those locations. Examples of highly conductive work locations are areas where employees are likely to contact water or conductive liquids.

- Employees must not have wet hands when plugging and unplugging flexible cords when energized equipment is involved.

25.1.5 Electric Power and Lighting Circuits

Do not allow the use of nonload-breaking-type cable connectors, fuses, terminal plugs, and cable splice connections to open or close circuits under load conditions.

After a circuit is de-energized by a circuit protective device, the circuit must not be manually re-energized until it has been determined that the equipment and circuit can be safely energized.

25.2 Equipment Maintenance and Installation

Minimum electrical safety requirements are established by ***MIOSHA General Industry Safety Standards – Part 39, Design Safety Standards for Electrical Systems***. These rules provide for practical safeguarding of employees in their workplaces. The rules cover design safety standards for electric utilization systems and include all electric equipment and installations used to provide electric power and light for employee workplaces. See Chapter 29.2 for electrical licensing requirements.

Common electrical hazards that might be found in a printing facility include missing covers on junction boxes, inadequate clearance and working space around electrical disconnects, electrical disconnects not clearly labeled, and extension cords with broken or exposed wiring.

25.2.1 General Requirements

General requirements for guarding electrical equipment in your printing facility include:

- Installing and using equipment according to the instructions;

- Enclosing parts that could produce sparks, arcs, or flames during normal operation;

- Marking disconnects to identify their purposes unless located so that the purpose is obvious. Markings should be durable enough to withstand the environment in which they are located;

- Providing and maintaining sufficient access and working space above all electrical equipment to permit ready and safe operation and maintenance; and

- Guarding live parts of electrical equipment operating at 50 volts or more with an approved cabinet, enclosure or other approved means to ensure that accidental contact is avoided.

25.2.2 Wiring Design and Protection

- Prohibit attachment of a grounded conductor to any terminal or lead that reverses designated polarity on equipment installed or modified after March 15, 1972.

- Ensure that fuses or circuit breakers are located or shielded so that employees will not be burned or otherwise injured by their operation.

- Provide a ground on exposed noncurrent-carrying metal parts of cord- and plug-connected equipment which may become energized such as refrigerators, freezers, and air conditioners, including those in employee break rooms.

25.2.3 Wiring Methods, Components & Equipment

These requirements apply to wiring methods, components, and equipment but do not apply to the conductors that are part of factory-assembled equipment.

- Ensure that metal raceways, cable armor, and other metal enclosures for conductors are metallically joined together and connected to all boxes, fittings, and cabinets in a way that provides effective electrical continuity.

- Provide approved covers on pull boxes, junction boxes, and fittings.

- Switches, circuit breakers, and switchboards must be surrounded by weatherproof enclosures when located in wet locations.

- Use flexible cords and cables that are approved and suitable for conditions of use and location.

Do not allow use of flexible cords and cables for any of the following situations:

- As a substitute for fixed wiring of a structure;
- Run through holes in walls, ceilings or floors;
- Run through doorways, windows or similar openings;
- Attached to building surfaces; or
- Concealed behind building walls, ceilings or floors.

Use flexible cords in continuous lengths without splice or tap. Connect flexible cords to devices and fittings so that strain relief is provided and prevents pull from being directly transmitted to joints or terminal screws.

In all wet or damp locations, install light fixtures that are approved for use in that environment.